

Ensuring renewable electricity investments

14 policy principles for a post-2020 perspective

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Background

This document was drafted by a group of 12 internationally renowned renewable electricity policy and market experts from different European countries and the US.

The 14 principles have been developed in a dialogue process convened and moderated by Raffaele Piria, and financially supported by the Smart Energy for Europe Platform. They reflect the shared views of the expert group on policy principles that need to be met by a framework for post-2020 renewable electricity (RES-E) investments.

The aim of this paper is to provide policy makers and interested stakeholders with a set of consensual principles for designing future remuneration schemes that will provide an effective, efficient and societally acceptable framework for RES-E investment in the coming decade.

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Introduction

Renewable energy deployment is a no-regrets option needed for achieving the EU's long-term decarbonisation target to reduce greenhouse gas emissions by 80-95% compared to 1990 levels and limit global warming to +2°C. In addition to climate protection, renewables offer a number of other advantages, including reduction of other harmful air, water and terrestrial impacts, increased security of supply, avoidance of the risks related to radioactivity and nuclear proliferation, and reducing dependence on energy imports.

A growing number of stakeholders and policy makers are calling for the adoption of 2030 renewable energy targets at EU level as well as in individual Member States. While long-term renewable targets are an important signal of political commitment, concrete policies and measures will also be necessary to ensure that renewable deployment increases and that ambitious targets are reached.

In the field of renewable electricity, one of the most important issues is how to guarantee that sufficient investment in additional renewable electricity capacities is triggered, and how to reasonably steer these investments.

In the last years, a large proportion of discussions at EU and national level on existing renewables support schemes have focused on the short term. With the principles presented here, we intend to contribute to a constructive and supportive debate about the long-term framework for investments that Europe will need in the period 2020-2030, in order to successfully implement renewables targets for 2030.

With this time perspective in mind, we no longer talk about "support schemes" for economically inferior renewable energies. Rather, we aim towards an enhanced system and market design, which will provide sufficient inherent incentives for investments into generation capacities based on both renewable energy technologies as well as on the conventional technologies needed as complements. We therefore refer to "remuneration schemes" rather than "support schemes".

A post-2020 perspective has a number of key implications:

- a) By 2020, variable renewables (wind, solar and wave energy) will have reached substantial shares in several parts of Europe, thereby strongly influencing power markets.
- b) The decade 2020-30 will remain a period of intense transition, during which further substantial increase in renewable generation capacity will be needed. An important part of this additional renewable capacity will consist of variable renewables.
- c) By 2020, the costs of some renewable generation technologies can be expected to further decline, both in absolute terms and in comparison to fossil and nuclear alternatives, through technological improvements and economies of scale in manufacturing, deployment and in the integration of renewables in the power system.
- d) In some more advanced regions, some of these conditions are already starting to occur, and therefore some of these principles will be relevant in certain parts of Europe before 2020.

It should be noted that a 2020-30 time horizon does not address the framework needed for RES investment to achieve very high shares (up to 80-100%) of renewable electricity at a European level by 2050. This may require further policies, but we do consider the policies needed towards 2030 to create the necessary foundation for that high-RES power system.

Limitation of this work

The principles presented here are not intended to cover all of the issues related to this topic. They simply reflect a set of shared conclusions that our group agreed, during an intense but relatively short period of common reflection.

Ensuring investment in renewable generation is absolutely essential, but certainly not a sufficient condition for achieving higher shares of renewables in the power sector. We are fully aware that investment is needed also in other power system assets, including generation adequacy, the transmission and distribution systems and other sources of flexibility, notably flexible and responsive load. A coordinated and well-balanced development of all elements of the power system certainly requires other policy measures that are not tackled in the present principles.

We are also fully aware that climate and other energy policy goals cannot be reached without significant action covering also the heating and the transport sectors. These are not covered by the present principle.

Short list of the principles

- A) Binding and ambitious 2030 RES deployment targets are needed.
- B) The electricity markets will not do it alone – even where the full costs of (variable) renewables are lower than average market prices, policy intervention will be needed to ensure that sufficient investment is attracted to RES-E projects.
- C) The schemes to remunerate investments in renewables should be oriented to deliver the politically agreed RES deployment targets.
- D) The schemes to remunerate investments in renewables should enable a continuous development of a portfolio of different RES-E technologies, which appear of relevance for meeting 2050 targets.
- E) The schemes to remunerate investments in renewables should be oriented to maximize the net benefits of the long-term transition of the energy system.
- F) The schemes to remunerate investments should be oriented at favouring the transition towards a sustainable energy supply system.
- G) The schemes to remunerate investments in renewables should allow for a differentiation between RES-E generation technologies and plant size, where this is necessary.
- H) The location of (renewable) generation investments matters, and will matter more, as we progress towards higher shares of variable renewables. Therefore, remuneration schemes or complementary policies should provide locational signals to investors in RES and balancing resources so as to promote system efficiency and reliability.
- I) The schemes to remunerate investments in renewables should avoid excessive rents for RES-E generators.
- J) The schemes to remunerate renewable investment should be effectively open for new entrants to develop projects.
- K) The schemes to remunerate investments in renewables should allow for prompt adjustments (of the support levels) for new investments, responding to changing conditions, while guaranteeing that the framework for investments and the RES deployment strategy are stable enough to attract investment capital and to achieve the long-term targets.
- L) The schemes to remunerate investments in renewables should be accompanied by dedicated policy instruments, which are able to protect vulnerable consumers from additional net energy costs caused by the transition to a renewable energy system.
- M) Debates around the design of remuneration schemes should take into account the need to create and maintain political acceptance as well as political feasibility.
- N) RES-E remuneration schemes and market frameworks should be further aligned and coordinated across Europe without jeopardizing the ability to adjust them to local contexts.

A) Binding and ambitious 2030 RES deployment targets are needed.

Renewable energy targets quantitatively express a political commitment that helps to overcome the inertia of existing regulatory frameworks, institutions, investors and incumbent stakeholders. The discontinuation of renewable energy targets after 2020 would be seen as a signal of political divestment after a decade of investment. However, the adoption of binding and sufficiently ambitious 2030 RES deployment targets has many benefits: they provide a necessary guideline for long term grid and power system planning; they provide the longer-term visibility and credibility to encourage investment in the RES supply chain, in transmission and distribution grids and in other flexibility sources like demand response, storage and flexible generation; they increase innovation and reduce costs by providing more trust in the long term policy framework; and they provide guidance to legislators and administrations when adopting and implementing relevant policies.

By enhancing the credibility of longer-term carbon targets, binding and ambitious renewable targets are not detrimental, but instrumental to a robust decarbonisation strategy.

B) The electricity markets will not do it alone – even where the full costs of (variable) renewables are lower than average market prices, policy intervention will be needed to ensure that sufficient investment is attracted to RES-E projects.

The cost reduction of wind and solar have allowed for a substantial reduction in the support that new installations receive. As the trend is expected to continue, it is frequently argued that support schemes for wind and solar should be phased out, as the technologies become cost competitive. However, policy measures will still be needed to ensure a robust investment framework for renewables, and several challenges need to be addressed through policy, power system and power market design.

Zero marginal costs technologies like wind and solar tend to bring down spot market prices at times of high wind or solar output. Furthermore, uncertainties about future revenues linked to policy, grid and carbon price developments are high and complicate the financing context for RES-E investments. As the shares of wind and solar are growing, their ability to recover investments only on the basis of reve-

nues from short-term energy-sales is undermined. Therefore, even where the full costs of (variable) renewables are lower than average market prices, policy intervention will be needed to ensure that sufficient investment is attracted to RES-E projects

The EU ETS needs to be improved. The current low carbon price under the EU ETS and continued failure to price other externalities does not provide a level playing field for technologies with quite different environmental impacts and maturity levels.

Uncertainties of carbon prices and electricity markets more broadly result in a risk premium for capital costs, which in particular impacts wind and solar as they face the highest share of capital costs in total costs. Remuneration schemes or other policy measures are needed to ensure that investments in RES-E project can be made at reasonable capital costs.

The current electricity market designs and grid codes were tailored for conventional power stations with dispatchable generation. They should be modified to recognize the growing penetration and operational needs of variable renewables.

C) The schemes to remunerate investments in renewables should be oriented to deliver the politically agreed RES deployment targets.

If RES deployment targets are adopted, ensuring sufficient investments in renewable generation capacities is the most essential condition for their achievement and thus for the credibility of political commitments. If weak investment remuneration raises doubts around whether targets will be met, then the remuneration schemes cannot be considered as fit to fulfil their main purpose. Other criteria can also be important, including cost effectiveness and total cost to consumers. However, the ability to reach the targets must be considered a key priority, otherwise the benefits of RES deployment targets (see principle A above) cannot be realised.

D) The schemes to remunerate investments in renewables should enable a continuous development of a portfolio of different RES-E technologies, which appear of relevance for meeting 2050 targets.

2020 and 2030 targets are milestones on a longer road towards a sustainable energy supply. Therefore, strategies for reaching 2020 and 2030 targets

should take into account that the transition towards higher shares of renewables will need to continue after those intermediate target years.

Given the high number of technological, economic, political and other uncertainties involved, nobody can reasonably define today what the power system will look like in 2050. A reasonable risk management strategy is to keep several opportunities open by diversifying the portfolio of potential future options. In a world with high shares of RES, the value of a diversified RES-E portfolio might be higher. Therefore, deploying exclusively those renewable technologies that are most convenient today is not wise in the medium and long-term. We should avoid locking-out technologies that are currently more expensive, but might both be less expensive over time, and useful or indispensable elements in a power portfolio in the long term.

Schemes remunerating RES investments are complementary to R&D policies. Without systematic long-term R&D support, PV would probably have never developed to a stage close to market deployment. Public support for RES R&D will continue to be essential. However, experience has shown that R&D policies alone are not sufficient to reduce production and delivery costs and bring new technologies to large market deployment: for instance, the large wind and PV price reductions of the last decade would not have been reached without policies promoting large scale market rollout. Remuneration schemes should provide incentives to drive down the costs of renewable technologies.

E) The schemes to remunerate investments in renewables should be oriented to maximize the net benefits of the long-term transition of the energy system.

Public debates on renewable remuneration schemes are often heavily influenced by the perception of their immediate costs. Once targets have been set, trying to reach them at the lowest possible immediate cost certainly is one reasonable guiding principle. However, it should not be the only principle.

Beyond the immediate costs of the remuneration scheme, one should consider its impact on the power system costs as a whole, in the short and in the long term. In order to maximise the net benefit of RES to the power system, including a limitation of the need for energy storage and expansion of transmission and distribution systems, remunera-

tion schemes for RES should give adequate price signals to RES generators, which support the overall coordination of generation and consumption.

Furthermore, it is important to consider not only the costs of the remuneration scheme, but also its benefits: not just abstractly in terms of reaching targets, but also in terms of reduced external effects, reduction of risks borne by society, reduction in fossil fuel imports, creation of local development and jobs, etc. Moreover, the transition towards high shares of renewables obviously implies a relatively long period of long-term investments, and therefore any cost-benefit analysis should consider not only the immediate costs and benefits, but also the long-term effects: certain investments may increase the burden within a certain decade, but be effective in terms of reducing the overall costs of the transition period. From this perspective, a cost-minimisation approach focused exclusively on intermediate targets (e.g. 2020 or 2030) fails to consider an important dimension and is likely to lead to suboptimal decisions.

F) The schemes to remunerate investments should be oriented at favouring the transition towards a sustainable energy supply system.

An obvious, though often neglected truth is that an unsustainable energy supply system cannot be sustained indefinitely. Sooner or later, we will be forced to change and it is wise to manage the transition over time with this in mind.

However, renewable energy deployment has an impact on nature and society, and it is important to try to keep this to a minimum by taking into account all kinds of effects (local/ global, on air, ground and soil, on biodiversity and social structures etc.). Thus, one should not only consider the electricity generation process, but the whole lifecycle, including the extraction, transport and refinement of fossil, nuclear and biomass fuels, as well as the whole manufacturing process for all kinds of facilities, decommissioning and waste disposal. Those renewables with the lowest GHG lifecycle balance and lowest other impacts should be privileged.

The reference to a sustainable “energy supply system” points to the interactions between the electricity sector and other parts of the European and global energy supply systems. Renewable electric-

ity is needed to substitute for fossil fuel consumption in the heating and transport sectors as well as in power generation, which provides even stronger reasons to support continued progress in RES generation in the coming decades.

G) The schemes to remunerate investments in renewables should allow for a differentiation among RES-E generation technologies, and plant sizes, where this is necessary.

Differentiation may be desirable for various reasons. Traditionally, the main motivations have been to accelerate learning curves of the more expensive renewable technologies; to avoid excessive producers rent, for instance for the developers of larger plants of the same technology; and to favour the activation of investments from households and small economic actors, which can mobilise additional investment capital and contribute to a broader social acceptance of the renewable energy transition. In the next decade, new reasons for differentiation may become more important: for example, favouring renewable generation investments that improve system stability or reduce the costs of balancing variable renewables. The latter could occur by encouraging dispatchable renewables, or the location of variable renewables in areas where their generation profile can be more easily integrated.

H) The location of (renewable) generation investments matters and will matter more, as we progress towards higher shares of variable renewables. Therefore, remuneration schemes or complementary policies should provide locational signals to investors in RES and balancing resources so as to promote system efficiency and reliability.

In the power system, the location of generation capacities has never been unimportant, except if one assumes unlimited electricity transmission capacities, with negligible transmission losses and costs. In fact, at any given time, transmission capacities are limited: bottlenecks exist and are becoming more relevant and frequent, due to the addition of large wind and solar capacities, often concentrated in regions with a weak grid.

While the costs of transmission are relatively low, the main limiting factors for grid expansion are

currently permission, planning and public acceptance, which de facto may limit the prospects for grid expansion. This means that bottlenecks are in certain cases likely to remain over a much longer period of time than would be reasonable from a purely economic point of view.

If no locational signals are provided, investors tend to concentrate variable renewable capacities in the areas with the best wind or solar resources and the lowest development and construction costs. Small PV is built mainly in areas where there are people willing and able to invest, and where roofs are available. Thus, renewables with similar generation profiles tend to be concentrated in the same areas, as for instance in Germany, with wind close to the coast and solar largely in the south.

Such an unstructured concentration makes sense in the first stages of deployment, as the costs of integration are still negligible or low. However, when variable renewable capacities increase, additional aspects need to be considered. For instance, adding 1 MW of PV in a local grid area that is already close to oversupply at noon in summer (for instance in some strong PV locations in Southern Italy) may make less sense than 1 MW of PV in an area where its output can always be absorbed at negligible integration costs, even if the solar radiation is lower (for instance in urban areas of Northern Italy). Also from the point of view of social acceptance and landscape protection, an excessive concentration of large-scale wind or solar in the same region may be detrimental.

Therefore, steering the location of (renewable) generation assets can become more and more important as the RES-E shares grow. The rationale and the scope of such a steering may vary from country to country, and depends on how and when the transmission grid is expected to be expanded. However, in the next decade, locational signals will often be necessary and should be provided either by the schemes remunerating the investments, or by other measures such as grid charges, locational wholesale electricity prices, dedicated planning areas or permitting procedures, or rural development policies. However, this should not undermine transmission grid expansion where needed, as this is typically the most economic measure for integrating higher shares of variable renewables into the network.

I) The schemes to remunerate investments in renewables should avoid excessive rents for RES-E generators.

Investments are pursued because investors want to turn know-how, access to capital, access to sites and project execution skills into profits. Hence remuneration schemes can only work if good projects are profitable. But if profit margins are too high, this creates additional costs for electricity consumers, undermining public and political acceptance. Thus high profits can trigger ex-post adjustments to policy frameworks, impact revenue streams, and therefore also limit the ability for investors to qualify for low cost financing opportunities.

Such high profits can occur when support levels are not differentiated by RES-E technology or location and some actors are able to capture high scarcity rents. Imagine a case where the remuneration for onshore wind and solar power is identical, and both technologies need to be deployed to meet future energy needs and/or renewable targets. If solar were more expensive, the remuneration level sufficient to trigger solar investment would be higher than the level necessary to trigger on-shore wind investment. In this case, if the support level for on-shore wind were lower, wind would still be deployed, but at lower policy costs, i.e., lower burden for electricity consumers who are generally those finally paying for the policy.

Several policy elements can contribute to avoid excessive rents for certain investors, including: differentiation of the remuneration scheme according to the RES-E technology and/or location (see principle G above), automatic and well planned degeneration of the support levels, rapid fine-tuning of the support level based on a monitoring of market developments (see principle K below) and measures favouring a healthy degree of competition among RES-E project developers and in general at all levels in the value chain.

J) The schemes to remunerate renewable investment should be effectively open for new entrants to develop projects.

Policy schemes should be open for new entrants to the market, in other words they should be 'inclusive'. Whether incumbents are reluctant to engage or not, a key principle of regulation should be to allow new players in the field to take part. This can be seen as a principle for ensuring competition and

as protection against the exercise of market power by dominant actors. This requires that processes for grid access and planning are simple and transparent to allow participation of various investors (i.e. local authorities, corporates, individuals, communities etc.). It also requires that the remuneration mechanism and market design provide for predictable and secure remuneration to allow the financing of plants by actors who may not have an existing portfolio of generation assets. Facilitating market entry can also help to overcome financing constraints since third parties - actors from other sectors – may bring new sources of capital to the market for investments in renewables.

Occasionally it may be difficult to assure fair treatment of new entrants through remuneration scheme design alone. Under such circumstances, proactive market monitoring and/or competition regulation may be needed to ensure realistic open access and should be seen as complementary tools to the remuneration schemes.

K) The schemes to remunerate investments in renewables should allow for prompt adjustments (of the support levels) for new investments, responding to changing conditions, while guaranteeing that the framework for investments and the RES deployment strategy are stable enough to attract investment capital and to achieve the long term targets.

Past experience has shown the importance of the ability to promptly adjust renewable support schemes in response to changing conditions. When investment costs go down more rapidly than expected, an inability to readjust the level of support leads to excessive investors rents, excessive costs for the consumers and an overheating of the market, sometimes jeopardising the political support for the scheme as a whole. In other words, remuneration schemes should be able to dynamically adapt to the reductions in the costs of technologies. Similarly, in the opposite case of rising costs of RES generation, prompt adjustments may be necessary. Adjustments should only be applied to new investments, and not on a retroactive basis.

Given the number of potential unexpected factors in the energy transition, a degree of flexibility will be necessary also in the future.

On the other hand, if a remuneration scheme can be modified too easily, it becomes unreliable and

would be counter-productive. A sound policy framework not only needs to encourage immediate investment in generation projects (renewable power systems), but also longer-term investment in the supply chain (e.g. R&D, factories), technical infrastructure (transmission and distribution grids, other flexibility sources, harbours for offshore-wind, test centres etc.) as well as in social infrastructure (training, distribution and retail chains, awareness raising etc.). From a long-term investment perspective, stop-and-go policy is highly detrimental. The confidence of citizens and investors in (future) policies is an essential public good. Therefore, it is necessary to avoid abrupt or retroactive changes that destroys confidence and disrupts markets.

For these reasons, a flexible fine-tuning must be combined with a long-term deployment strategy stable enough to achieve long-term deployment targets.

L) The schemes to remunerate investments in renewables should be accompanied by dedicated policy instruments, which are able to protect vulnerable consumers from additional net energy costs caused by the transition to a renewable energy system.

Energy prices for final consumers in Europe are likely to increase in the future due to a number of reasons. In part this is because investments in the electricity infrastructure of many countries have been at a low level since the liberalisation of electricity markets. In the next two decades, a significant share of the existing power plants has to be replaced and considerable investment in the grid infrastructure is needed, regardless of the need for a transition to a renewable energy system. In order to reach ambitious renewable energy targets, higher investments in renewable generation capacities will be needed than would be necessary in a “business as usual” scenario. On the other hand, over the longer term the operating costs of most renewable plants will be significantly lower than those expected for fossil plants. An energy system with high shares of renewables will also differ in terms of the geographical distribution of power generation, and will thus require modifications to the electricity grid. Additional investments will be needed for new flexibility options (such as energy storage and Demand Side Management) in order to manage the variability of an energy system with high shares of wind and solar generation. Most of these investments will have to be borne by energy

consumers. Thus, the net costs of the transition to an energy system with high shares of renewable sources is likely to incur higher energy prices in a first phase compared to a “business as usual” scenario, while the lower operating costs of renewable energy will reduce energy prices in the longer run.

A considerable part of the expected net increase of energy prices can be compensated by higher efforts in energy efficiency. Thus while energy prices may rise, reduced demand will mean that bills may not go up or go up very little. Most consumers will be able to bear a moderate increase in their energy bills, but for some vulnerable consumer groups, this might not be possible. Thus the transition to a renewable energy system should be accompanied by dedicated policy instruments, which support these vulnerable consumers.

M) Debates around the design of remuneration schemes should take into account the need to create and maintain political acceptance as well as political feasibility.

While making these considerations, it is necessary to keep in mind some principles of common sense. Policies need to be practically adoptable and amendable within the times and procedures of our political systems at national or at EU level, if EU policy solutions are proposed. Additionally, the energy transition process needs to happen within our democratic system, and therefore public acceptance and political feasibility are important criteria and need to be considered in the design of RES remuneration schemes.

N) RES-E remuneration schemes and market frameworks should be further aligned and coordinated across Europe without jeopardizing the ability to adjust them to local contexts.

The commitment and pace of deploying RES-E varies among European member states. Nevertheless, the transition to high shares of RES-E is a European project that will require a joint effort across Europe and cannot be implemented by single countries alone.

With increasing electricity market convergence in many European countries, a further alignment of investment frameworks becomes more important. The coordination of RES-E remuneration schemes and market frameworks across national borders can

deliver a number of benefits: increased stability and transparency for investors, economies of scale, increased competition, and improved exploitation of resources. In consequence, European coordination can trigger additional RES-E investment while lowering the overall costs of RES-E deployment. On the other hand, it is important to protect the flexibility of RES-E policies to be able to adjust to local framework conditions. A lack of context specificity can undermine the ability of remuneration frameworks to overcome local market barriers and can lower their public acceptance.

Regardless of whether it is established at national, macro-regional or at EU level, the framework to remunerate RES-E generation investments needs to fulfil the policy principles defined in this paper. Among others, it should permit differentiation between RES-E technologies, prompt adjustment of remuneration levels and locational signals.

